Banning 2 ✓

DR. BANNING ON SPINAL DEFORMITIES.

FROM BANNING'S MECHANICAL PATHOLOGY AND THERAPEUTICS.

FUNDAMENTAL PROPOSITIONS.

I. INASMUCH as the human body is purely mechanical in the formation and arrangement of all its parts, from the grossest organs to the finest cells, it follows that any variation from the primitive arrangement of any one of these must involve corresponding morbid manifestations (both mechanical and vital), not only in the parts immediately concerned, but also in those which are associated with them, either by juxtapósition, continuity, or function.

II. The viscera are as much under the law of a specific orbit of being and bearing as the bones, and any departure from this will constitute a practical dislocation, which may involve corresponding functional derangements by cancelling the primary relations between these organs and their vital forces.

III. The normal status of these weighty, lengthy, fragile, and irritable viscera, consists mainly in their being maintained in the ascendant by their surrounding elastic abdominal walls, in opposition to a state of consecutive dependency from their ligamentous attachments.

IV. In proportion as the body is erect, and the abdominal and dorsal tissues energetic, will this primary ascendant position be steadily maintained; the support being commenced at the lowest intestine, and carried up by each succeeding viscus to the apex of the pile; each supported organ becomes the successive and aggressive support of its next superior neighbor.

V. In proportion as these supporting tissues relax from any cause, there must ensue a corresponding change in the visceral status; they must lose their altitude, compactness, and support, and assume a loose, dangling, and elongated condition. In other words, a lineal dislocation is induced, involving a train of both physical and functional derangements, such as a solid common sense might clearly foretell.

SPINAL SYMMETRY AND DEFORMITY.

DIGNITY OF PHYSICAL UPRIGHTNESS.

It is apparent, that throughout the animal kingdom the gift of physical perpendicularity has been reserved to man alone; that, by and through it, man is installed in his recognized lordship over the beast of the field; and that in it we may discern the boundary between the soul of the beast, which goeth downward, and that of man, which goeth upward. It is further apparent, that physical uprightness is both significative and comprehensive of moral uprightness also; is divine in its institution, amanizing in its working, and the insignia royal of the *Great King*, that *man is born* heir to heavenly immortality. And so irrepressible was the perception of this significative nature of animal erectness, that Grecian philology baptized man ANTHROPOS, The being with the upturned (heavenward) face.

PHILOSOPHY OF THE ERECT POSTURE.

This we find to consist chiefly in a transverse and antero-posterior equipoising of the superior trunk over and upon the body's centre of gravity; and, by the aid of mathematical law, the centre is demonstrated to be located in two lumbar vertebræ. The latter is a fundamental and controlling point, which is rendered apparent by a glance at Figures 1 and 2

Fig. 1 (front) shows, by vertical line *b b*, and oblique lines *c c*, *c c*, that when the equal limbs treat evenly, the upward force of the earth, on the one hand, and the downward force of the superior trunk, on the other, must converge in the lumbar vertebræ on perpendicular line *b b*, which is vertical to a point equidistant between the feet, and so balance the body transversely over the point of convergence.

Fig. 2 (side) shows that when the body is perpendicular to itself, the gravity of the superior trunk balances (antero-posteriorly) over and upon two lumbar vertebræ—the lumbar and dorsal spinal curves acting as neutralizing equivalents reciprocally. If the latter were not so, perpendicular line *b b*, and oblique lines *K K*, *L L*, could not all of them intersect precisely at one and the same point in the lumbar vertebræ—as they are compelled to do by virtue of inexorable law.

Thus, then, it appears clear, that when this two-pillared pile is perpendicular, it constitutes a complete microcosmic centripetal system in itself, with the lumbar spinal curve for its centre; and that, from and around the latter, all the antagonistic muscular forces and motions play, in activity, and return to it in repose, exemplifying the law, that all orderly systems work from centre to circumference, not from circumference to centre; and also, that when equipoised upon this centre, the body, in both its axes, is literally pressed into symmetry by and in the ratio of its own gravity, and must so remain until centripetality is broken by muscular or other disturbing force. It further appears, that when this lumbar curve is in this mathematical centre of the body, it is both the source and the arbiter of all the superior trunkal movements and bearings; and that until it either advances or retreats, the superior trunk can make no considerable motion, either way, without falling. That is, in bowing, the lumbar spine must first retreat behind its central bearing; or, in leaning back of that point, the latter must first advance. Hence it is, then, that if the thumb is firmly pressed upon the lumbar curve of an upright man (at the true axis), an attempt to bow will bring the whole body's weight to bear against the thumb, so anxious is the centre to retreat to allow

the superior trunk to advance; and if the effort to throw the chest forward is great, and the thumb holds firmly, the heels must rise, and the body fall (turn up at root). Hence, also, why, when the experiment is changed, and the thumb is held some two inches from the spinal centre, that centre will retreat and touch the thumb in bowing. The philosophical inference of this is, that all the graceful motions of the superior trunk are derived from, and dependent upon, preceding opposite movements of the lumbar spine, and never otherwise, and that the unsuspected source of both physical symmetry and deformity lies in this spinal centre, and

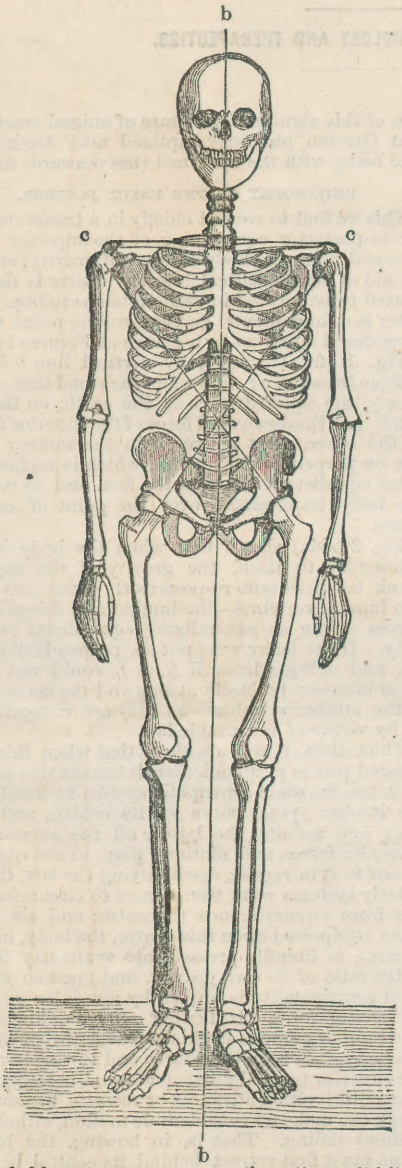

FIG. 1. *b b* vertical line, traversing the entire medial line of the spinal column, and falling equi-distant between the feet; *c c*, *c c*, line from the basal and upper corners of the trunk, and converging in the lumbar spine on *b b*, illustrating that to be the point where the upward force of the earth through each leg, and the downward force of the body, converge as upon a transverse centre of gravity, and so, literally press the body into transverse symmetry upon that point.

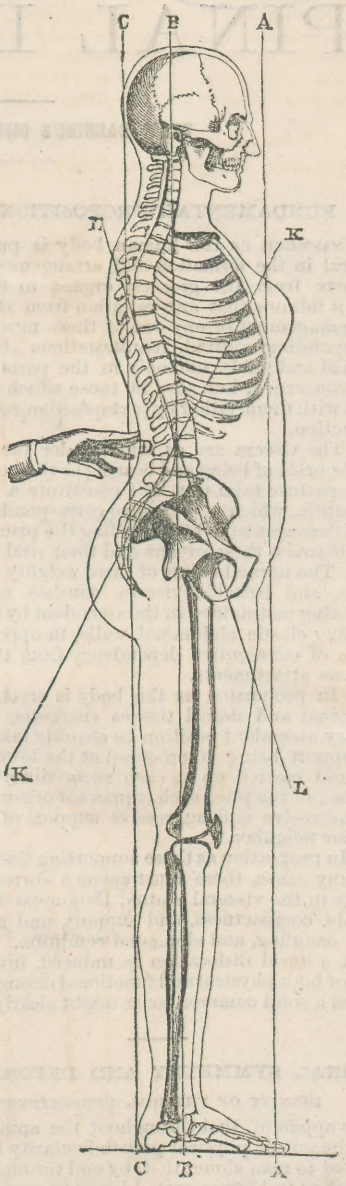

FIG. 2. *A A*, vertical line, showing tip of nose, pubes, a large toe, all to be in line when the body is erect. *C C*, l showing extreme occiput to be vertical to extreme heel, a that there should be a considerable space between it and t lumbar spine. *B B*, line passing through the cervical a lumbar medulla spinalis, and also the hip, knee, and ank joints, showing all these points also to be in line, and that lumbar curve is the body's antero-posterior centre of grav *L L*, *K K*, oblique lines, traversing the advancing and retr ing spinal planes, and intersecting on *B B*, in lumbar cur thus giving mathematical proof that the lumbar spine at *B* is the body's antero-posterior centre of gravity and spinal ax

that this is the point at which to first operate, both for the continuance of symmetry and removal of deformity. This idea also explains the fixed fact, that gross and cumbrous bodies are proverbially more erect and sure-footed than those which are slight and lean. That is, the spinal centre is, in them, so shoved in advance of a line vertical to the ankle, as to compel the superior trunk to be poised sufficiently behind that point, to antagonize the force of anterior abdominal weight.

PHILOSOPHY OF DEFORMITY.

Having seen that perpendicularity is mainly the result of an equipoising of the superior trunk upon the spinal centre, which is vertically supported on two equal bases, we are prepared, by a glance at Figures 3, 4, and 5, to comprehend the rationale of spinal obliquity.

Fig. 3 represents Fig. 2 with its dorsal muscles relaxed, and its lumbar spinal curve consequently retreated behind its vertical point, *B B*, leaving the chest to *appear* to have advanced. But that this is a delusion, is evident from the fact that the mathematical diagram (which is identical with that in 1 and 2) shows the head and feet to be intact, and

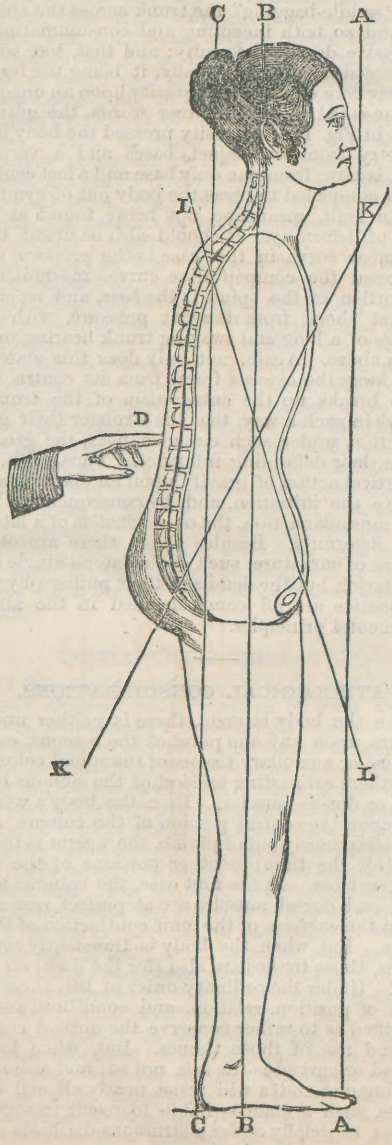

FIG. 3. Illustrating a form drooping from habit or weakness; and that the cause is, a receded spinal axis, and not displaced shoulders.

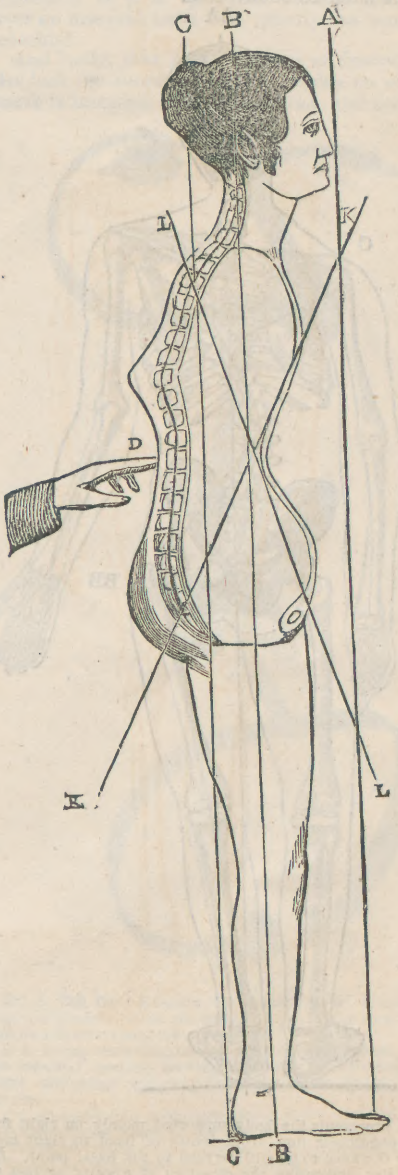

FIG. 4. Illustrating the same as Fig. 3, only with an acute angle, and not a mere general curve.

only the *middle* of the body (or lumbar axis) has changed. Thus, then, we are forced to say that the legitimate working of gravity alone has caused the droop, because the pivot has receded.

Fig. 4 shows substantially the same facts as does Fig. 3, only that in the first case the defect was a *curve*, and was general, and Fig. 4 shows the defect to be an *angle*, and to be local. But bowed down as the figure is, the lines show that the chest is still vertical to the foot, and that the angle only has receded, and that weight alone is increasing the derangement, in which decided pathological conditions are liable to be involved.

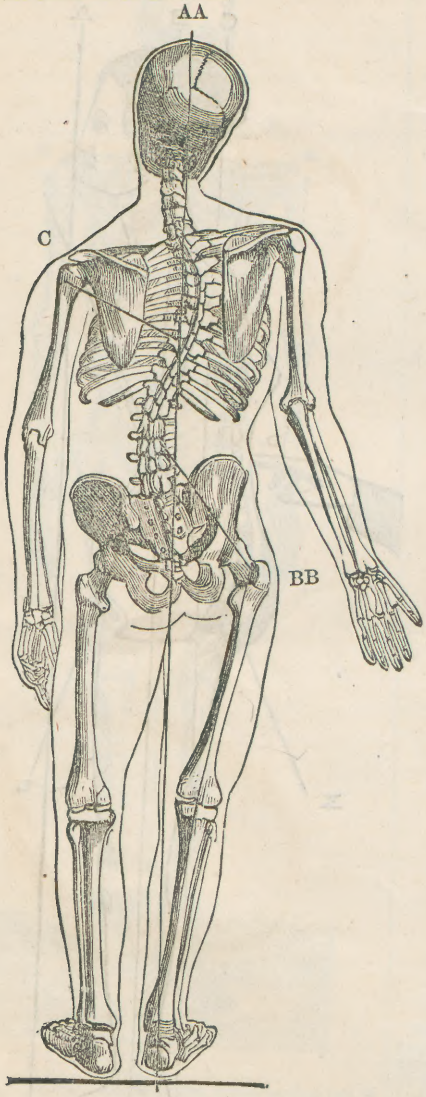

FIG. 5 represents the body supported mainly on right foot. *AA*, perpendicular line, from centre of head to right heel; showing the head to be still vertical to the basal point. *BB*, angular line, indicating the direction of gravity against the lumbar spine and shoving it to one side. *C*, line showing the weight of the head and left shoulder to be in the interest of a dorsal curve to the right.

Fig. 5 represents a body resting mainly upon the right foot, and the upper trunk, in consequence, leaning to the right, to preserve its equipoise over the supporting base. This compels gravity, in lieu of traversing the entire perpendicular medulla, as in Fig. 1, to break across it at its lumbar and dorsal portions, and to act upon the frame much as it would to sit upon a chair's edge when poised only upon two of its feet; *i. e.*, the earth crowds the right hip-bone upward and inward, and throws the left one correspondingly downward and outward. Next, the vertical action of gravity upon the trunk, in turn, must crowd the dorsal spine and right shoulder to the right and upward, thereby practically "saddle-bagging" the trunk across the spinal axis, and so both incepting and consummating a progressive double deformity; and that, too, without antecedent disease usually, it being the legitimate working of the law of gravity upon an unequal and one-sided base. In other words, the gravity which, in Fig. 1, of necessity pressed the body into symmetry from two equal bases and a vertical centre, is now, from one only base and a lost centre, equally compelled to press the body out of symmetry; the fault, meantime, not being found at the points of deformity. It should also be noted, that the lumbar curve in this case is the *primary*, and the dorsal the compensative curve, inasmuch as that portion of the spine is the *base*, and receives the first shock from tangent pressure, with the leverage of a long and swaying trunk bearing upon it from above. Again, not only does this state of things sway the *osseous* frame from its centre, but it also breaks up the antagonism of the trunkal muscles in such a way, that the stronger their general action, under such circumstances, the greater will be their deforming influence. Thus, then, by the vertical action of gravity upon an *unequal* base, we have the initiation, and, by consequent unbalanced muscular action, the *consummation* of a lateral spinal deformity. Besides these, there are other varieties of curvature, such as the lateral-single and the anterior, but the details of their philosophy and therapeutics are all comprehended in the above fundamental principles.

PATHOLOGICAL CONSIDERATIONS.

When the body is erect, there is neither undue pressure upon any one point of the osseous, cartilaginous, or medullary tissues of the spinal column, nor is there exhausting tension of the spinous ligaments or dorsal muscles. Then the body's weight bears upon the central portion of the column, and when temporarily out of plumb, the weight is translated (for the time) to other portions of the vertebral surfaces. In the first case, the spinous ligaments and dorsal muscles are at perfect rest, and only in the exercise of the tonic contraction of their texture. But when the body is transiently *out* of its axes, those tissues are also (for the time) on the strain. Under the ordinary order of life, these varieties of position, relation, and condition, are so diversified as to rather conserve the normal condition and use of those tissues. But, when to be drooped or curved is the *rule*, not so; and although some organic states will resist nearly all evil tendencies, such a state is liable to result in serious changes, especially under a strumous diathesis and a state of general cachexia.

Touching these changes, for the professional reader, it is sufficient to say, 1st, that the tendency

of the greatly increased amount of permanent compression thus brought to bear upon the inter-vertebral cartilages and spongy bones, is adapted and liable to increasing irritation, tenderness, inflammation, and softening of those tissues, which, if too long continued, will result in absorption of both bone and cartilage, and, of course, correspondingly increase the spinal angle.

Next, this state of things is liable to impinge upon the spinal marrow and the roots of the branching nerves, and induce a concatenation of local and radiated effects, especially such as relate to the cerebral and locomotive functions.

Next, that under such circumstances the consequent and continued traction upon the spinous ligaments and dorsal muscles, is directly adapted, first, to weary, next to irritate, and lastly to exhaust those tissues; not so much on account of the increased burden, as of its unmitigated continuousness. This, in connection with the aforesaid changes going on in the cartilages and spongy bones, not only induces weariness and diminished physical force, but also those varied sensations which the patient so quaintly expresses, such as "giddiness," "confusion of ideas," "loss of memory," "heat in the head and back," "a constant tired feeling," an "aching," "grinding," "gnawing," "wrangling and raving distracted feeling."

The incipient stages of these symptoms are usually called "nervous or rheumatic," and are either neglected or unsuccessfully treated with plasters, anodynes, and tonics, while it never occurs to the physician to ascertain, 1st, whether there is any curvature or tenderness of the spine; and 2d, if the body is permanently out of plumb, and consequently the spinal muscles, ligaments, cartilages, and spongy bones undergoing a torture, something like the wearing of tight boots on tender feet, and that of a perpetual weight hanging from the arms.

Indeed, the profession must bear with us while we say, that this miserable diagnosis is the rock upon which the last hopes of thousands have been dashed.

THERAPEUTIC INDICATIONS.

In this department also, we are forced to take a purely physical view, by virtue of what has gone before, and remark fundamentally, that as most of the varieties of curvature have been mainly developed by and through the body's being unequally supported upon one foot and one hip, and the consequent gliding of the spinal axis to one side of its primary vertical position, it follows that the first curative indication is, to *reverse the force of the body's gravity to the opposite side of the spine at each point of* CURVATURE. For by that, we compel the force which maintains the difficulty to correct the same.

In order to do this, we have only to shift the weight of the body to the opposite foot, and at the same time to vigorously support and crowd the receding convexity of the lumbar spine towards its primary vertical point, as in Figs. 1 and 2.

In doing this we not only change the base and reverse the force of gravity, and bring the body into a degree of centripetality, but also break up an undue action of one set of muscles, and compel the opposite set to come into requisition and commence a return to their primary antagonism. In a few words, then, we thereby reverse the mathematical bearings of the *frame* toward the gravity, and thus compel the muscular "shrouds and backstays" to come into an orderly antagonistic action.

But how shall this be accomplished? To this inquiry we reply, First, that proper muscular habits, either under ordinary labors or special calisthenics, would about invariably prevent these obliquities (all things equal), but that when they have fairly gotten under way, seldom or never could they alone rectify such cases; and that in connection with electric, gymnastic, and constitutional treatment, they positively demand co-operative physical force.

Next, that such mechanical force should embody a fulcrum and lever counterpart of the curvature, inasmuch as it is by a fulcrum and lever action over an unequal base, that gravity has worked the mischief.

And lastly, that in proportion as instrumentalities lack the above counter principles, on which the curve is incepted and perpetuated, and act simply

FIG. 6. THE BODY-BALANCE, for balancing the body upon its centre of gravity; when the subject is young the form is slight, and no abnormal support is required.

A A, spring encircling the pelvis; *B B*, convex pads, covering the inguinal opening, serving as points of resistance, giving some abdominal support, and protecting against inguinal hernia.

C C, shoulder-bow with caps, which press upon the anterior convexity of the heads of the humeri. Its action is to press in the inner edges of the scapula, roll out the shoulders, and so flatten the latter and expand the chest.

D D, spinal lever and dorsal pads, which, when joined to the shoulder-bow and hip-spring, so push forward the lumbar curve as to balance and symmetrize the body. A physiological and airy substitute for the corset, especially adapted to school boys and girls.

on the principle of circular pressure, or by direct abstract force, they cannot correct a lost axis, or give any support in which a progressive cure, by muscular eduction, inheres; such appliances would exert only a dead circular or screw force, which is not aggressive, and which is likely to rest for its fulcrum upon other weak parts which need support themselves. Such contrivances can only come about as near to bracing and levelling the body in the interests of muscular eduction and centripetality, as one's pulling powerfully upon his own waistband would toward elevating him heavenward. Keeping these fundamental principles in mind, we will now consider a case of

SIMPLE DROOPING,

which may be the result of habit, or of muscular weakness; it may also be simple, or complicated with spinal tenderness and irritation. If it is a case resulting from habit merely, with no disease, and the form is slight (especially if the subject be a child), the body-balance (see Fig. 6) may be all that is requisite for crowding the antero-posterior spinal axis to its vertical point, and so compelling gravity to support and not crush the form. Again,

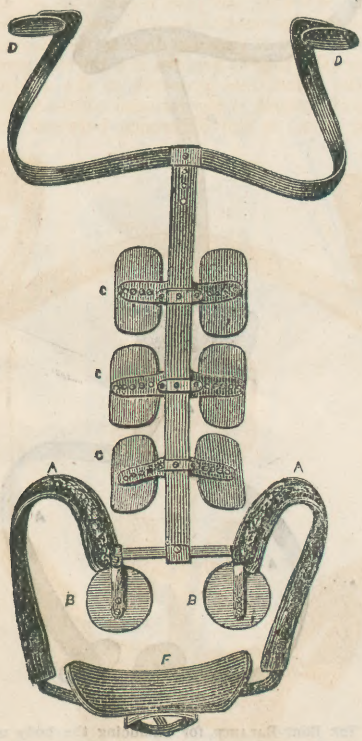

FIG. 7. ABDOMINAL AND SPINAL SHOULDER-BRACE.—*A A*, arches of the mainspring passing above each hip-bone, avoiding all pressure on the bones, nerves, or blood-vessels, and furnishing the power of the instrument. *B B*, pads supporting glutæi muscles on either side. *C C*, aggressive supporting saddles, to either side of the dorso-lumbar spine (in ordinary cases only the lower saddle to be used), holding that portion of the spine properly forward. *D D*, spring support, resting anteriorly upon the heads of the humeri. *F*, front pad, elevating abdominal viscera.

The combined action of all is, to elevate the lineal viscera, sustain the lumbar spine in its vertical position, and poise the superior trunk behind the spinal axis.

if this light and cool instrument were worn during school hours by boys and girls of slender make, it would avert a vast amount of deformity and ungracefulness, and prove a national blessing in the shape of a well-formed people; for, in the plastic and susceptible tissues of childhood, it is literally true, that "Train up a child in the way he should go, and when he is old he will not depart from it." Again: that "Just as the twig is bent the tree is inclined." If any one doubts the wisdom of this suggestion, he has only to note the fact, that school girls about invariably assume the "Grecian bend;" and if he takes notice of the cramping seat and desk arrangements between which children are packed, he will wonder how any diligent student can fail to retract the epigastrium, round the shoulders, compress the chest, and so become heir to many inconvenient and fatal troubles.

Another effect of action upon this suggestion would be, the banishment of the heating and compressing corset, which gives all of its support and improvement (?) of form, either by compressing the waist and depressing the viscera, or by furnishing something to lean upon. Whilst the balance, on the other hand, sits *behind*, pushing forward the small of the back, poising the body upon its centre, levelling and sloping the shoulders, and expanding the chest in the interest of respiration and digestion. One lets the body lean upon it, whilst the other balances the body upon itself.

On this point we cannot close without reminding the profession that to effect a *revolution* which would be replete in good taste and humane results, they have only to exercise a legitimate interest with families where their opinions are at once "law and gospel." And, should any of them demur to this, on the score that the balance is an "artificial" support, we would say in turn, Is not the inevitable corset an artificial support also, and contraband of physical law, whilst the balance acts in the interests of such law? "Let us take the foxes, the little foxes, that spoil the vines, for our vines have tender grapes."

But as a rule, this airy brace is too slight, except in cases of children, and the abdominal and spinal shoulder-brace (Fig. 7), in some one of its forms, is required. Ordinarily, but one dorsal saddle should be used on this instrument, and that should be applied to the lumbar spine; but if actual weakness, in addition to habit, is present, or if there is much tenderness, then for more complete spinal support, one, two, or even three saddles may be added; still, as little support as will answer should be used. When applied (see Fig. 8), this instrument repoises the body upon its spinal centre, and thus removes stress from the dorsal muscles and spinal ligaments on the one hand, and irritating compression from the inter-vertebrals and spongy bones on the other; and the restorative powers are re-enfranchised. But, with much

TENDERNESS AND IRRITATION,

though properly poised, a portion of the body's weight requires to be actually lifted from the tender points; otherwise, through continual compression, all hope of a cure may be cut off by ultimate softening, caries, abscess, and curvature. In fact, neglect just here has resulted in the culmination of thousands of hopeless spinal affections, which attention to this injunction might have averted.

In meeting this additional indication, the spinal prop (Fig. 9) has ever proved efficient; and Fig. 10 represents its practical workings upon the body.

It differs from other instruments in use for the same purpose—

1*st.* In having a firm and immovable *point above* and *inside* the innominati. Consequently, it does not recede under the body's pressure; compresses no muscle or circulating vessel; and its periphera being so near to the body's transverse centre, it does not "shirk" on shifting the body from one foot to the other.

2*d.* Its whole action is from behind, no part of it touching the sternum or ribs, at any point, in the largest respirations or freest motions. Its effect is to elevate and shove the thorax and spine forward by a purely fulcrum and lever action, touching only at convex and distal points, leaving intermediate and receded parts free to move and expand under the concentric action of the combination.

3*d.* It has no straps, buckles, or upholstery, and is consequently light, airy, and cool, and makes no appearance through the dress; and,

4*th.* Its abdominal action is of such an undulating character at the lower hypogastrium, as to elevate the lineal viscera and compel them to brace out and expand the body, just as the body braces out and expands its garments (a fundamental desideratum).

When this prop is rightly adjusted, it so diminishes actual weight upon the diseased vertebræ, and braces them from within by the viscera, and from without by itself, that in many cases of spinal irritation and caries which have lain for years under blisters, issues, caustic, and the moxa, a marked progressive improvement has commenced on its first application.

The usual and unsuccessful treatment of this condition, by scoring, hewing, and burning, is based upon the *orthodox* fallacy, that the inception and development of the difficulty depend upon a primary local morbid action, and that this must be "*translated to the surface*" before a cure can be effected. Whereas, our plan regards the tenderness (and the disorganization as well) not as the disease, but as the effect of violence done to the tissues; and consequently, that to remove the hurtful pressure, and at the same time preserve to the subject the free use of himself, is the rational course to pursue.

What, then, is the difference between the two

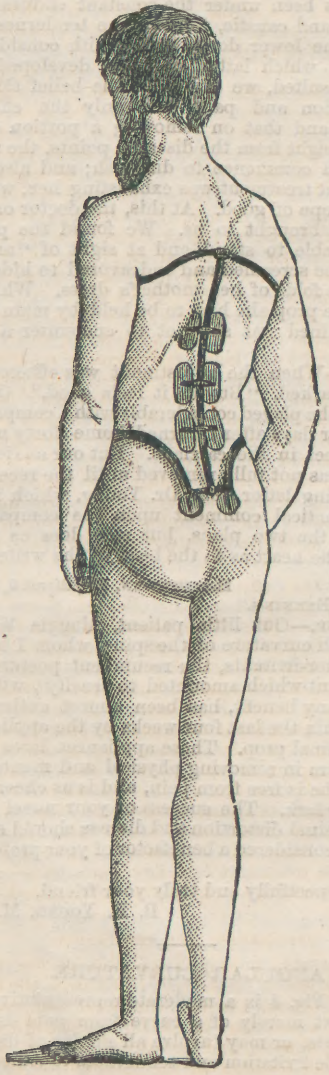

FIG. 8 represents the abdominal and spinal shoulder-brace, correcting drooping by conjointly springing forward the dorso-lumbar spine, drawing back the superior trunk, and elevating the abdominal viscera, and consequently expanding the thorax and hypochondria. In the mean time perfect visceral and muscular freedom is preserved.

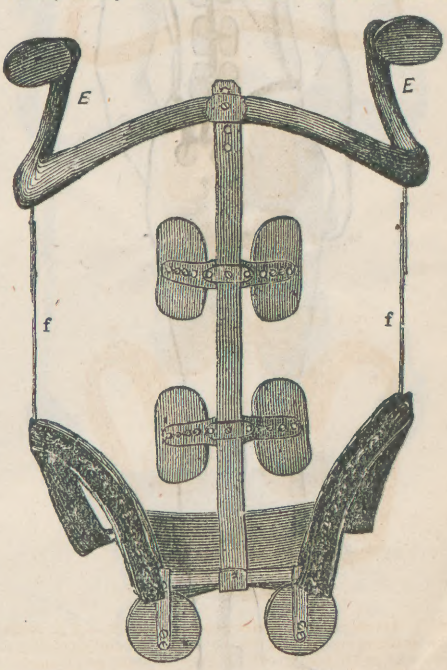

FIG. 9. THE SPINAL PROP consists of Fig. 7, with the addition of *f f*, which are extensible side-posts resting upon the arches of Fig. 7, and converting the shoulder-bow, *E E*, into unyielding crutches.

By this addition, not only are the viscera elevated, the shoulders drawn back, and the proper forward spring of the lumbar spine preserved, but a tender, irritable, or carious spine is vastly relieved of pressure. The subject is allowed to exercise freely, and threatened disorganization and curvature are averted.

plans? One treats an effect for the cause, the other removes the cause. Of the manifold verity of this, we might recite many cases, but will select but two:

Miss P., of Chicago, aged 22, gradually brought herself to the following condition by over-exertion as a teacher. She at first felt merely weakness at the epigastrium and lumbar region; gradually the spine became intensely painful, often inducing convulsions, and ultimately she was so prostrated that turning in bed caused the greatest agony. In this state she was brought to our office, and fainted from the exhaustion of sheer agony, caused by her temporary vertical position. During her half-conscious state we managed to adjust the prop; on reviving, she said, "I feel better." She was next helped to sit upon the side of the bed, and remarked, "I sit without agony." A few moments after, she walked alone, and, whilst standing, related her former sufferings to a patient similarly afflicted. Some months after this she informed us by letter, that she had been able to return to her old vocation, and walked several blocks daily. Previous to our seeing this case, the ingenuity of several physicians had been exhausted in contriving scientific tortures, by which to remove the disorganizing effect of pressure upon susceptible spinal points.

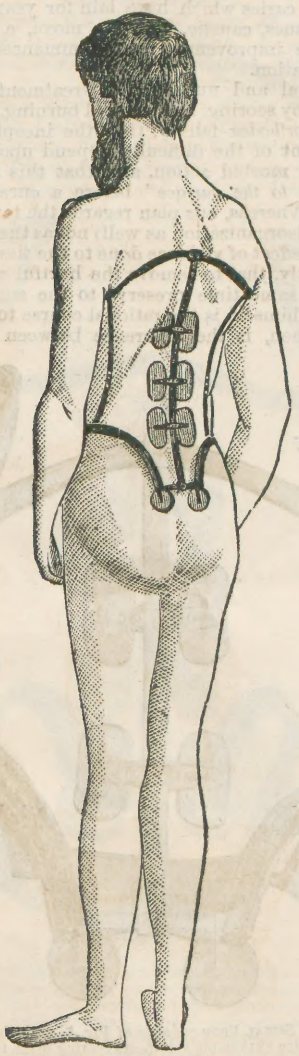

FIG. 10 shows Fig. 9 not only supporting the abdomen, expanding the waist and chest, and supporting the weak spine, but also relieving spinal irritation, by taking the weight of the body from tender spinal points, and protecting the latter in the case of jolting and twisting the body. This it accomplishes by the crutch action under the axilla, which compels the innominati to carry the superincumbent weight and receive the shocks.

Case 2.—Maggie, Ky., aged eight years, had for four years been under the constant endurance of the moxa and caustic, for extreme tenderness and pain in the lower dorsal spine, with considerable curvature, which latter gradually developed. On being consulted, we expressed the belief that the inflammation and pain were only the effect of pressure, and that on removing a portion of the trunkal weight from the diseased points, the sufferings would commence to diminish; and also, that her present treatment was exhausting her, without rational hope of good. At this, the doctor ordered her to be brought to us. We found the patient totally unable to stand, and at sight of "another doctor" she screamed and endeavored to hide herself in the folds of her mother's dress. While adjusting the prop she had to be held by main force, so determined was she not to encounter a fresh doctor.

Result.—When the adjustment was effected, the child remarked, "Buy it; it feels good." On the same day she played considerably with a companion, and in four days after returned home (forty miles), sitting erect in the carriage. But our anxiety for the case was not fully removed until the receipt of the following letter from Dr. Young, which is not only a practical comment upon the comparative merits of the two plans, but also does as much credit to the heart as to the head of the writer:

ELIZABETHTOWN, KY., *March* 9, 1856.

Dr. E. P. BANNING.

DEAR SIR,—Our little patient, Maggie Wintersmith, with curvature of the spine, whom I treated with counter-irritants, the recumbent posture, etc. (a treatment which amounted to cruelty), with but slight, if any benefit, has been almost entirely relieved within the last four weeks by the application of your spinal prop. These appliances have acted like a charm in removing physical and mental suffering. She is free from pain, and is as cheerful as a morning lark. The success of your novel treatment in spinal distortion and disease should entitle you to be considered a benefactor of your profession and race.

Respectfully and truly your friend,

B. R. YOUNG, M. D.

ANGULAR CURVATURE.

Of this, Fig. 4 is a moderate representative. It may consist merely of a curve from pure debility and cachexia, or may involve all grades of disease, from simple irritation and tenderness to caries and abscess.

With respect to the causes of these deformities, we only say, that whilst a strumous diathesis may predispose to them (and often does), abundant experience has shown that, in a vast proportion of the cases, their development is traceable to some

protracted or sudden violence done to the spine—such as excessive effort at play, or lifting, or kicks and falls. Especially is the latter frequently true in the case of infants left in the care of faithless nurses.

Accordingly, there will be two indications of treatment, viz.:—constitutional and mechanical. If there be *evidence* of constitutional vitiation, let it be attended to at once. On this head, we only remark generally, that ferruginated and iodinized tonics, with the best of living and a perfect system of hygiene, constitute our plan.

The second indication is, to relieve the spine of a part of the burden which is bearing down with such unmerciful leverage upon the weak points, and to protect the tender points from the aggravating influence of friction and impingement, under jolts and twisting motions.

If there is abscess or caries, we must not at first attempt much by the straightening process, but be content to so remove the irritation of pressure as to favor a firm anchylosis. But if no caries exist, we may not only protect the tender points from pressure, but actually enter upon such extending support as is adapted to be indefinitely aggressive upon the curve. For the accomplishment of this, we have in Fig. 9 (the Spinal Prop) all that is requisite, where the angle is slight and not so prominent as to impinge against the spinal lever which holds the supporting saddle against it. (See Fig. 10, showing its practical working.)

But where the angle is too prominent for that form of prop, then the Revolving Spinal Prop, Fig. 11 (represented intact in Fig. 12), meets the difficulty.

This instrument, by its hollow square, makes impingement against the spine unnecessary, and its dorsal plates, by revolving and running up and down on their supporting screw rods, not only reach the desired locality, but also secure, in every position, an even and uniform fit to every plane of the curve.

When either of these instruments is even loosely applied, their beneficial results are often surprising and immediate. Not unfrequently paralytic limbs begin to move and ultimately to carry the body. Their usual working, however, has been—first, to give comfort, and next, to enable those who have been unable to sit, to immediately do so, and soon to walk. Of course these results are produced by the simultaneous elevation of the viscera, support of the spinal curve, and drawing back of the shoulders; and next, by removing pressure from the vertebral bodies, and stress from the spinous ligaments and dorsal muscles.

The results of this treatment have usually been as follows: First, if the patient were a child of fair constitutional powers, and taken in time, a radical cure has been effected. But if the subject were an adult, and actual caries established, an anchylosis has been effected, but the curvature not wholly removed.

Case 1.—Mrs. Springstead, of Rochester, was for one year the subject of a posterior curvature, which not only enfeebled her legs, but also instituted every conceivable nervous derangement on the whole system. Opium had no power to quiet the spasms or to produce sleep, and during the six months previous to our taking charge of her, she had not been able to move so much as one toe, and much less either limb. From the commencement, the case was plied with an abundance of strychnine and counter-irritants, until pronounced to be softening of the brain and spinal marrow.

In this condition, as a last resort we applied the spinal prop, in the bare hope that the paralysis was the result of pressure upon the roots of the motor nerves.

Result.—Same evening, patient looked and said she felt better; following day, motion was restored to one toe. In a week more she stood up by holding on to something. In two months she walked considerably, and on the third month she attended to her household affairs. No other remedy was applied.

Case 2.—Miss T., Galesburg, Illinois, had been mainly recumbent for one year, any attempt at standing or sitting producing alarming cerebral symptoms, with great prostration, pain in spine, and a tremulous condition of the entire body. During this time she had not been neglected by the best medical aid in the country. On examination, there was perceptible but the slightest protuberance and tenderness at one or two of the lower dorsal vertebræ. For this patient we applied the prop, and ordered nothing else to be done.

Result.—She immediately spoke of a "strange feeling of composure—as if some over-hanging trouble had passed." Before night, was dressed and sat up; and at tea time, to the alarm of the family, she walked out to tea; returned very tired, but "slept, and awoke refreshed." On the following day, walked in the yard and soon after rode

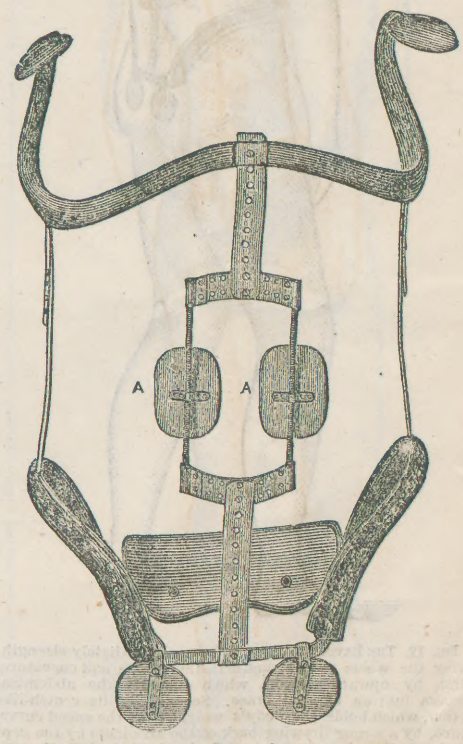

FIG. 11. REVOLVING SPINAL PROP.—Differing from Fig. 8 only in the form of its spinal lever, which accommodates the angle. *A. A*, plates which revolve on screw posts, so as to fit the planes of the curve on either side, and secure an equal flat support. These plates are curved to the form, and may be run up and down on the screw posts, to suit the height of the curve; they are a positive protection against bruising or irritating the prominent parts.

out. At the termination of three months we met her over one thousand miles from home, comparatively well.

And now, as these two cases fairly represent several hundreds upon all of which caustics, issues, and confinement to bed had been but too persistently tried, what room is there for comment as to the comparative merits of the two methods?

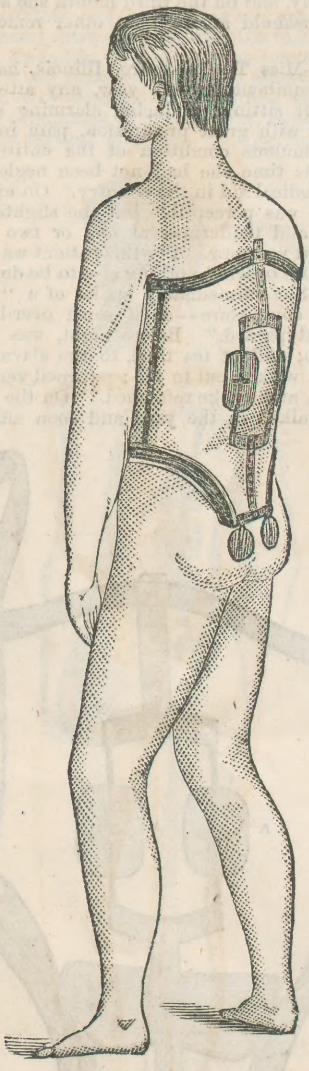

FIG. 12. THE REVOLVING SPINAL PROP.—Immediately strengthening the whole person, and arresting caries and curvature. First, by upward support which converts the abdominal viscera into an internal brace. Second, by its crutch-like action, which holds the body's weight from the spinal curve. Third, by a strong drawing back of the shoulders by the caps on the shoulder-bow in front of the heads of the humeri; and, Fourth, by the strong bracing and pushing forward action of the revolving dorsal plates on the vertical screw rods upon the curvature. By a revolving action, these plates are self-adjustable to any slope of the spinal angle at either side, with no necessity for any impingement upon the spinous protuberance. As the case improves, the vertical support may be successively increased by means of slides and screws in the side-posts.

LATERAL CURVATURE.

This affection may be single or double, and is specially common to females. Fortunately, it is seldom complicated with either caries or spinal irritation. It is usually the result of an early habit of standing on one foot, and sitting upon the hip of the same side. Such a habit, where the person is tall and slight, can scarcely fail to result in these irregularities. Another common cause is, attempting to rise with the body unsupported, after a long and prostrating illness. In such a case, the muscular "shrouds and back-stays" are inadequate to "trim mast," and the body "saddle-bags" across the spine, as in Figs. 5 and 14, pages 4 and 11. In such a case, if the subject but for one moment stands upon the left foot, and balances over it, there commences an improvement, indicating that we have only to reverse the force of gravity at each point of the curvature, to compel the body's own weight to press it toward its axial line, and to level

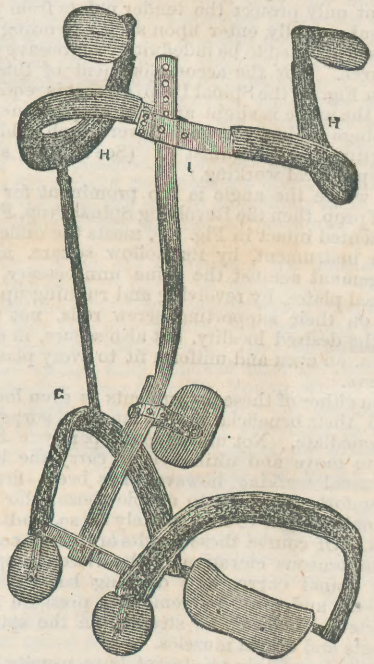

FIG. 13. THE CENTRIPETAL SPINAL LEVER, FOR DOUBLE SPINAL CURVATURES.—*A*, *A*, the pelvic portion of the abdominal and spinal shoulder-brace, supporting the abdomen and acting as a firm point from which the superior portions of the instrument can operate. *G*, the side-post which supports the shoulder-bow and furnishes the lateral power for correcting the obliquity; the sharp-set in sidepost, *G*, close by pelvic portion, furnishes the correcting force of *H*, *H*; the power being always in the ratio of that set, and is to be increased or diminished to suit the requisitions. *H*, *H*, shoulder-bow supported by side-post, *G*. Its left branch elevates the depressed left shoulder, and draws the weight of the scapula from the receding spine under it. The right branch of the bow passes around the right shoulder, and presses and draws it to the left, by virtue of side-post, *G*. *I*, hinge-joint, by which the bearings of the right and left branches of the bow can be changed to suit the planes of the irregular surfaces. *K*, lever supporting the dorsal saddle. The action of this is, to support the lumbar curve and push it forward, and is so twisted as to press only on that convexity and crowd it to the right.

The general action is, to reverse the body's weight to the left foot, and so to deprive gravity of its depressing force.

its basal and upper corners. This indication is filled by the

CENTRIPETAL SPINAL LEVER,

it being a spring power, and the exact converse of the curvature at each point.

When its pelvic portion only is fastened, its upper portion leans away from the superior trunk (see Figs. 13 and 14); but when its upper portion is forced around the shoulders, the result is, that the right elevated innominatum is crowded downwards, the left depressed shoulder raised, the lumbar curve crowded to the right, and the superior dorsal curve to the left. Its whole action is a fulcrum and lever one, and at cross purposes with the deformity, at its every point.

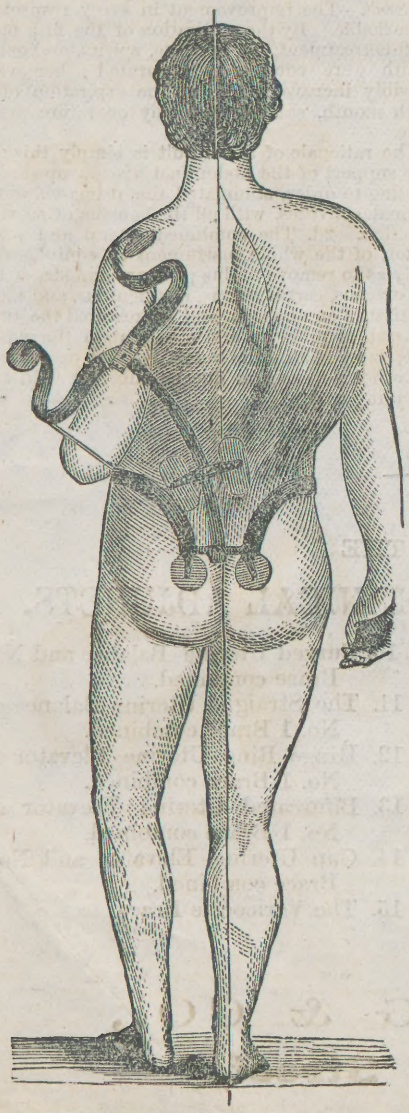

FIG. 14. Centripetal Spinal Lever accomplishing nothing, its lever powers not being brought into activity by being brought around the shoulders. (See explanation of Fig. 13.)

Whilst all this is going on, the instrument passes all depressions and concavities untouched, and so serves to improve the symmetry at such points by filling them out and supporting the garments.

But the crowning excellence furnished by this lever is, that after it has passed all concavities untouched, and pressed upon all convexities with a proper force, and in the right direction, its action is persistently aggressive at every salient point; and that, through its cross purposes on the curve, it provokes the patient to lean in the direction of the brace for respite from its perpetual stress. This not only reverses the force of weight at each point of curvature, but shifts the weight to the left foot, and

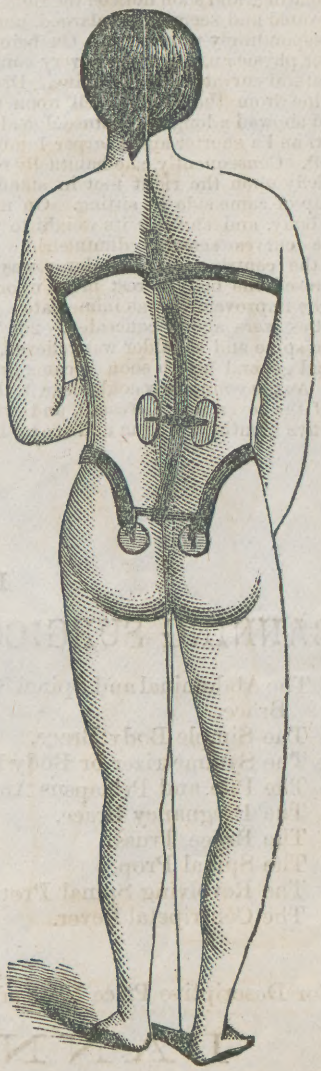

FIG. 15. Centripetal Spinal Lever in full activity, elevating and drawing out the left shoulder; supporting the lumbar curve to the right, and aggressively restoring the body to its axis, and so crushing out the curvature by means of the very gravity which caused it. (See explanation of Fig. 13.)

The heel of the left foot of this figure should have been placed at the foot of the vertical line.

brings the opposite and hitherto useless set of muscles into activity. In all this, then, we do nothing which we ought not to do, nor leave undone that which we ought to do, and so restore the normal relations between gravity and muscularity, as to institute a new order of things in the interest of that plan which was divinely ordained. (See Fig. 15, showing the lever in full activity.)

Of successful cases we might cite several hundred, but propriety confines us to the selection of two, which are just representatives of the whole:

Case 1.—Miss W., New York, aged 15, after a prostrating attack of typhoid fever, from which she recovered slowly, found her gait becoming unequal and vacillating, and soon noticed the right shoulder quite elevated and seemingly enlarged, and the left hip correspondingly prominent. On being sent to me by her physician, there was a very considerable double lateral curvature of the spine. Dropping a plumb line from the head, it fell upon the right heel, and showed a long and obtuse dorsal curve to the right, and a shorter and sharper lumbar curve to the left. Consequently, she habitually rested the body chiefly upon the right foot in standing, and on the hip of same side in sitting. On manipulating the body, and shifting its weight to the (left) foot, the curves sensibly diminished. To this patient the centripetal spinal lever was applied, which caused the body to rest more upon the left foot. The improvement was immediate. 1st. The inequalities were about concealed. 2d. The dull aching in spine and shoulder was relieved, and the spirits and general health soon became greatly improved. As the young lady could bear it, the lateral action of the lever was increased, and within the space of five months, the form and strength became so entirely changed as to render the lever no longer necessary, and she is now an elegant and graceful young lady.

Case 2. ———, aged 13, was sent to me by her physician, with a very decided double lateral curvature. She had developed rapidly, and menstruated at between the ages of 10 and 11. She complained of lassitude, and labored under constant melancholy. Her appetite was very defective, and a steady decline was manifest. As this was a clear case of muscular prostration and deformity, through the one-sided action of the body's gravity, and as every tonic and alterative treatment had already been pertinaciously tried, I applied only the centripetal lever, according to the above plan, and gradually increased its vertical and lateral power.

Result.—The improvement in every respect was remarkable. By the expiration of the fifth month of this treatment, her appetite, spirits, and general health were completely renovated; her weight sensibly increased, and, at the expiration of the sixth month, scarcely was any curvature perceptible.

The rationale of this result is simply this: 1st. The support of the abdominal viscera upward, according to order, stimulated the prima-via to their normal activities, with all the benefits of so vital a function. 2d. The combined lateral and vertical action of the whole instrument so equipoised the body as to remove undue pressure and stress upon the osseous, cartilaginous, ligamentous, and muscular tissues on one side, and so restored the proper amount of pressure and stress upon the opposite side, as by rest on the one hand, and excitation on the other, to evoke a due equilibrium with corresponding energy.

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